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Innovative Housing Grants Program

EXTERIOR WALL OPENING COVER FITTINGS FOR RESIDENTIAL CONSTRUCTION

prepared by

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For
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BACKGROUND

Modern wood frame housing requires numerous penetrations of the exterior weather membrane for electrical outlets, light fixtures and service connections. These penetrations cause problems in fitting the exterior cladding around these items in an attractive manner and often allow air, dirt, water or insects to enter the wall.

Enduro Siding Ltd. proposed to solve these problems by developing a plastic cover which could be attached to the wall sheathing around a penetration before the exterior finish is applied. This cover would provide a leakproof seal around the penetration and smooth regular surfaces against which to butt the exterior finish. This simple but elegant idea required product development and testing, which was the purpose of this project.

OBJECTIVES

The main objectives of this project were as follows:

1) Design a product and produce a prototype suitable for sealing and finishing the opening around a duplex electrical outlet in an exterior wall.

2) Test the prototype as appropriate to refine the concept.

3) Establish production procedures.

4) Estimate future markets, assess competitive methods and determine acceptable product costs.

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89-00617/ APPROACH

As noted, the project concentrated on the development and testing of a cover suitable for exterior duplex electrical receptacles. These are the most common wall penetrations in residential housing and their typical positioning low on an outside wall exposes them to more severe weather conditions than many other openings. Therefore, results based on duplex receptacles could be adapted to apply to other types of wall penetrations.

Design

Current methods of installing exterior receptacles were examined in order to document the problem that the new product would be designed to overcome, and to ensure that the product would be compatible with standard construction procedures. Design criteria were established, and product development work was carried out to establish dimensional requirements, material selection and production methods. A patent search and investigation of applicable standards was also carried out.

Testing and Assessment

The airtightness of various duplex receptacle installation methods was measured with and without a wall opening cover. In addition market research was carried out to determine the market response to the product, pricing levels and the relative importance of various attributes of the product.

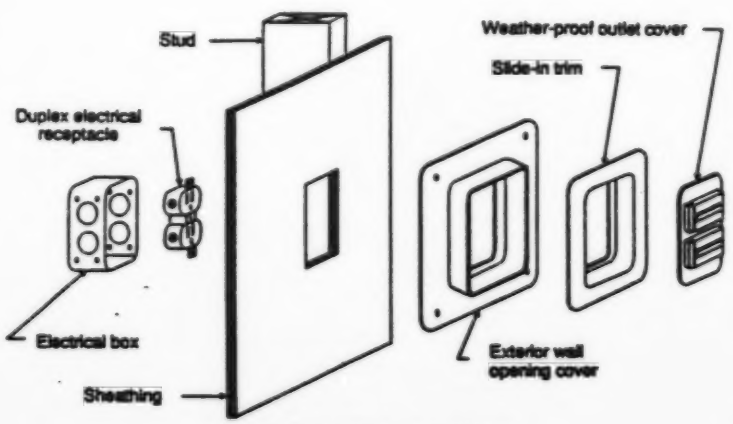
RESULTS

Review of Current Practices

Exterior electrical outlets in frame construction installed using conventional methods were found to be both unattractive and poorly sealed in many cases. The causes appeared to be lack of a solid base for a weatherproof coverplate, absence of a simple trim installation procedure and poor workmanship.

The external wall opening cover (EWOC) was designed to overcome these problems.

The resulting cover consists of a injection molded plastic baseplate attached to the exterior sheathing. The baseplate will cover and seal oversized or irregularly shaped sheathing openings. A slide-in trim piece or "top hat" covers the siding edges giving an attractive, professionally finished appearance (see Figure). This cover provides a leakproof seal to the penetration and smooth regular surfaces against which to butt the exterior finish.



EXTERIOR WALL OPENING COVER CONCEPT

The modular design of the EWOC allows it to accommodate electrical duplex receptacles, saucer and octagon electrical boxes, dryer vents and water bibs or gas lines with the same parent casting. Simple economical mold inserts allow all variations to be injected from one mold.

Inquiries with various regulatory and standards authorities indicated that there were no applicable standards governing the product. However, to enhance its marketability, a formal application for a CMHC acceptance number was initiated.

Production Methods

To achieve the complex and structurally rigid shape required, injection molding was selected as the production method for the EWOC baseplate.
The material used was acrylic-butadienne-styrene (ABS) because of its excellent injection molding properties.

The trim, or "top hat", was vacuum formed using polyethylene terephalate (PET). This material is tough, resistant to heat and sunlight, and economical to produce.

Test Results

Tests carried out in the Alberta Research Council laboratories measured air infiltration in a simulated exterior wall containing a gasketted duplex electrical receptacle in various configurations with and without EWOC's. The tests indicated greatly reduced air infiltration rates with the EWOC compared to conventional practices.

The market research predicted a positive market response to the EWOC due to general dissatisfaction with current finishing techniques and the relatively low cost of the product.

CONCLUSIONS

The study concludes that the EWOC effectively seals an electrical duplex outlet using a superior construction technique. It can be developed to accommodate a wide variety of exterior wall penetrations in a simple, cost effective and attractive manner.